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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/620,728	07/16/2003	Yasuhiro Mizohata	P/ 2699-25	9065

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EXAMINER	
WILKINS III, HARRY D	
ART UNIT	**PAPER NUMBER**
1742	

DATE MAILED: 09/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/620,728	MIZOHATA ET AL.	
	Examiner	Art Unit	
	Harry D. Wilkins, III	1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 July 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-11,13-16 and 23-40* is/are pending in the application.

4a) Of the above claim(s) *13-16 and 23-35* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-11 and 36-40* is/are rejected.

7)☒ Claim(s) *1* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *4/26/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 31 July 2006 has been entered.

Status

2. The rejection of claims 5-8 under 35 USC 112, 2nd paragraph has been withdrawn in view of Applicant's amendment to clarify the scope of claim 5.

3. The prior rejection of claims under 35 USC 103 as being unpatentable over Starinshak et al has been withdrawn in view of Applicant's amendment to the scope of the claims requiring that the first circulation mechanism circulates plating liquid between the copper dissolution tank and the plating liquid container.

4. The rejection of claims 36-38 under 35 USC 103 as being unpatentable over Starinshak et al (and combinations thereof) have been withdrawn in view of Applicant's amendment to the scope of the claims requiring that copper dissolution tank be densely filled with a copper supply source.

Claim Objections

5. Claim 1 is objected to because of the following informalities: the recitation "the plating liquid container" occurs prior to the recitation "a plating liquid container". It is

suggested that the "wherein" clause added by the 31 July 2006 amendment be moved to the end of the claim to provide proper antecedent basis for "the plating liquid container". Appropriate correction is required.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 5, 6, 36, 37 and 39 are rejected under 35 U.S.C. 102(e) as being anticipated by Mizohata et al (US 6,958,113)

The applied reference has a common inventor and assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

See figures 1, 2, 7, 9, 10, 11 and 22. It appears that this reference teaches each and every feature as claimed.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 36-38 and are rejected under 35 U.S.C. 103(a) as being unpatentable over Ting et al (US 5,997,712) in view of Starinshak et al (US 5,100,517).

Ting et al teach (see abstract, figure 1 and col. 1) a plating apparatus including a plating section (not shown) for performing a plating process with the use of a plating liquid for plating a substrate with copper, the plating section having an insoluble anode; a copper dissolution tank (29) connected to the plating section for communication of the plating liquid with the plating section and accommodating therein a copper supply source; a plating liquid container (11) capable of containing the plating liquid in a greater amount than the plating vessel; a first and a second circulation mechanism for circulating plating liquid between the copper dissolution tank and the plating liquid container and between the plating liquid container and the plating vessel. The apparatus is set up such that the copper dissolution tank was connected to the plating section via the plating liquid container. The cartridge was densely filled with the copper supply source.

Thus, Ting et al fail to teach that the copper supply source was generally uniformly dissolvable as claimed.

However, Starinshak et al teach (see col. 5, lines 52-61) that copper supply sources (24) could be made in various geometric shapes, and that the various shapes had no material affect on the dissolution of the copper supply source.

Therefore, it would have been obvious to one of ordinary skill in the art to have selected the shape of the copper supply source to be uniformly dissolvable as claimed since it was known in the art to make a copper supply source to be in any desired shape, such as in a uniformly dissolvable arrangement, in a pipe form disposed generally parallel to the flow path and plates disposed generally parallel to the flow path. Changing the shape of the copper supply source was shown to be an obvious variation by the teachings of Starinshak et al.

10. Claims 1, 4, 9-10 and 40 and are rejected under 35 U.S.C. 103(a) as being unpatentable over Ting et al (US 5,997,712) in view of Schaer (US 4,324,623) and Dordi et al (US 6,258,220).

Ting et al teach (see abstract, figure 1 and col. 1) a plating apparatus including a plating section (not shown) for performing a plating process with the use of a plating liquid for plating a substrate with copper, the plating section having an insoluble anode; a copper dissolution tank (29) connected to the plating section for communication of the plating liquid with the plating section and accommodating therein a copper supply source; a plating liquid container (11) capable of containing the plating liquid in a greater amount than the plating vessel; a first and a second circulation mechanism for circulating plating liquid between the copper dissolution tank and the plating liquid container and between the plating liquid container and the plating vessel. The

apparatus is set up such that the copper dissolution tank was connected to the plating section via the plating liquid container.

Thus, Ting et al fail to teach (1) that the copper supply source was composed of copper wire and (2) including a plurality of plating vessels in the plating section.

With respect to (1), Ting et al teach preferentially using copper hydroxide or copper oxide as the copper supply source, but expressly teaches (see paragraph spanning cols. 2 and 3) that the copper supply source should not be construed as being limited to only those copper supply sources. However, Schaer teaches (see abstract) utilizing scrap copper wires as the copper source to replenish a copper electroplating solution. Therefore, it would have been obvious to one of ordinary skill in the art to have utilized cheaper scrap copper wire as the copper supply source instead of the copper hydroxide or copper oxide in order to have reduced overall costs of electroplating.

With respect to (2), Ting et al teach utilizing a single plating vessel. Dordi et al teach (see figure 16 and related description) utilizing a single plating liquid container (602) to feed plating solution to multiple plating cells. Therefore, one of ordinary skill in the art would have found it obvious to have utilized the copper electroplating solution replenishment apparatus of Ting et al with multiple plating vessels as suggested by Dordi et al because utilizing a single electroplating solution source with multiple plating vessels increased uniformity across the multiple plating vessels.

Regarding claim 4, Ting et al teach (see abstract) that the copper dissolution tank was a cartridge accommodating the copper supply source and that the cartridge had a

plating liquid inlet port and a plating liquid outlet port and was detachable from the plating apparatus.

Regarding claim 9, Ting et al teach a single copper dissolution tank (cartridge). However, it would have been obvious to one of ordinary skill in the art to have added additional cartridges to increase through-put of the apparatus. Further, Ting et al fail to teach a weight measuring section for individually measuring the weights of the copper cartridges. However, it would have been obvious to one of ordinary skill in the art to have used the weight of the copper cartridge to determine when the cartridge was empty (so as to signal an operator that it needed to be replaced), and to select the copper cartridge as necessary based on the weight (amount) of copper remaining in the basket to improve the autonomous operating lifetime. As the dissolution process occurs, the copper in the dissolution tank was consumed. Various alternatives were possible for determining when to replace the copper in the dissolution tank, such as a visual inspection of the amount of copper remaining (as disclosed by Starinshak et al), the weight of the copper remaining in the tank (such as by the process disclosed by Wales et al (US 4,796,782)), the concentration of copper leaving the dissolution tank (a decrease in the concentration leaving the dissolution tank would indicate that there was insufficient copper present), calculating the amount of copper consumed based on the power consumption of the dissolution tank (by using Faraday's Law), etc. Utilizing a different means for determining when the copper dissolution tank needed to be replenished would have been obvious to one of ordinary skill in the art. Absent

reasoning why such structure provided unexpected results, these claims are held to be *prima facie* obvious.

Regarding claim 10, it would have been obvious to have used the copper supply source with the lowest weight first in order operate the device with a maximum of filled baskets at any time. By using the lowest basket first, a majority of the baskets will remain filled, such that the cell could operate a longer amount of time without having to have human intervention to fill the baskets.

Regarding claim 40, the weight measuring section would have had a weight meter for receiving each of the cartridges. It would have been obvious to one of ordinary skill in the art to have modified the shape of the cartridges as needed to fit with into the weight meters.

11. Claims 3 and 11 are is rejected under 35 U.S.C. 103(a) as being unpatentable over Ting et al (US 5,997,712) in view of Schaer (US 4,324,623) and Dordi et al (US 6,258,220) as applied above to claims 1 and 9 and further in view of Starinshak et al (US 5,100,517).

The teachings of Ting et al, Schaer and Dordi et al do not teach the claimed shape of the copper supply source.

However, Starinshak et al teach (see col. 5, lines 52-61) that copper supply sources (24) could be made in various geometric shapes, and that the various shapes had no material affect on the dissolution of the copper supply source.

Therefore, it would have been obvious to one of ordinary skill in the art to have made the copper supply source to be in any desired shape, such as a stack of mesh

woven-wire sheets. Changing the shape of the copper supply source was shown to be an obvious variation by the teachings of Starinshak et al.

12. Claims 5-8 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Starinshak et al (US 5,100,517) in view of Mizohata et al (US 6,958,113).

Starinshak et al teach (see abstract and figure) a plating apparatus including a plating section (10) for performing a plating process with the use of a plating liquid for plating a substrate with copper, the plating section having an insoluble anode (15), a copper dissolution tank (20) connected to the plating section for communication of the plating liquid with the plating section and accommodating therein a copper supply source (24) and a circulation mechanism for circulating the plating liquid through the plating section and the copper dissolution tank.

Starinshak et al do not teach (1) a replacement liquid supplying section for supplying a replacement liquid into the copper dissolution tank and (2) a control section which performs a control operation to circulate the plating liquid through the plating section and the copper dissolution tank when the plating process is performed in the plating section and to stop the circulation of the plating liquid and replace the plating liquid in the copper dissolution tank with the replacement liquid supplied from the replacement liquid supplying section after completion of the plating process in the plating section.

However, Mizohata et al teach (see cols. 53 and 54) that when plating was stopped, flow to the copper dissolution tank should also be stopped to prevent a build up of copper concentration in the solution. However, Mizohata et al further teach that

leaving the copper supply source in the electrolyte solution undesirably deteriorated the surface of the copper supply source, such that it was necessary to replace the electrolyte solution in the copper dissolution tank with a replacement liquid. Mizohata et al teach using a control section for performing each of these steps.

Therefore, it would have been obvious to one of ordinary skill in the art to have added a replacement liquid section and control section as taught by Mizohata et al in order to reduce side effects when the plating is stopped.

Regarding claim 6, Starinshak et al teach (see figure and col. 7, lines 19-29) a water supplying section for supplying water liquid into the copper dissolution tank for maintaining the level of liquid in the system. Mizohata et al teach (see cols. 54-55 and figure 22) that the apparatus included a deionized water feed and that the control section controlled the operation such that deionized water was fed to the copper dissolution tank first to rinse the tank and then the replacement liquid was fed into the copper dissolution tank.

Regarding claim 7, Starinshak et al do teach (see col. 5, lines 52-61) that the copper supply source (24) could be made in various geometric shapes. Therefore, it would have been obvious to one of ordinary skill in the art to have made the copper supply source to be in any desired shape, such as a stack of mesh sheets. Changing the shape of the copper supply source was shown to be an obvious variation by the teachings of Starinshak et al.

Regarding claim 8, Starinshak et al do not teach that the copper dissolution tank included a cartridge accommodating the copper supply source. Starinshak et al do

teach (see col. 5, lines 52-61) that the copper supply source (24) could be made in various geometric shapes and included a titanium basket (25). The copper dissolution tank included a plating liquid inlet port for introducing the plating liquid and a plating liquid outlet port for discharging the plating liquid. However, it would have been obvious to one of ordinary skill in the art to have made the copper supply source to be in a removable cartridge in the copper dissolution tank because making a portion of a device separable has been held to be obvious. See MPEP 2144.04.V.C. The motivation to make the titanium basket of Starinshak et al removable (i.e.-formed as a cartridge) would have been in order to be able to easily replace the basket should fouling occur.

Response to Arguments

13. Applicant's arguments with respect to claims 1, 5, 9 and 36-38 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D. Wilkins, III whose telephone number is 571-272-1251. The examiner can normally be reached on M-F 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V. King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Harry D Wilkins, III
Primary Examiner
Art Unit 1742

hdw